



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/042,827

01/04/2002

Upendra V. Chaudhari

YOR920010539US1(590.076)

7326

35195

7590

01/04/2005

FERENCE & ASSOCIATES  
400 BROAD STREET  
PITTSBURGH, PA 15143

EXAMINER

PIERRE, MYRIAM

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 01/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/042,827	CHAUDHARI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Myriam Pierre	2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                    |                                                                             |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____                                                 |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>01/04/02</u> .                                                            | 6) <input type="checkbox"/> Other: ____                                     |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 1-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The term "input data" and the consequent abstract, mathematical calculations thereof without physical input or output are non-statutory. The examiner suggests using speech or audio data for input or output for the data being clustered.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 6, 9, 16-17, and 19 are rejected under U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed.

Art Unit: 2654

Cir. 1999). The term "probability density" in claims 6, 9, 16-17, and 19 is used by the claim to mean "probability distribution function", while the accepted meaning is the first derivative thereof. The term is indefinite because the specification does not clearly redefine the term. The examiner has interpreted "density" to mean "distribution".

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-3, 11-13 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Passera (6,272,449).

As to claims 1, 11 and 21, Passera teaches,

obtaining input data ("**input data set**", Fig. 1, element 10);

creating predetermined (**predetermined**, col. 4, line 60) number of non-overlapping

(**CHAID**, chi-squared automatic interaction detection, col. 1, line 35) subsets of the

input data ("**data set**" or "**subspaces**", Fig. 1, elements 18-19, col. 1, lines 31-34);

and

Art Unit: 2654

creating a predetermined number of non-overlapping subsets by splitting the input data recursively (**“data splitting model” splits input into subspaces, “recursively split”, col. 4, lines 16-19, 61-62 and Fig. 1, element 16**).

As to claim 2 and 12, Passera teaches, initially splitting the input data into at least two sets of output data (**“input data set”, “data splitting module”, output is subpace<sub>1-2</sub>, Fig. 1, elements 10, 16 and 18-19**).

As to claim 3 and 13, Passera teaches, splitting the at least two sets of output data recursively (**output and “data-splitting” module recursively splits subspaces, col. 4, lines 61-62, col. 5, lines 28-29 and Fig. 3, elements 34 and 36**); and repeating the recursive splitting of output data sets (**Fig. 4, see loop, elements 46-49**) until predetermined number of non-overlapping subsets is obtained (**col. 4, lines 59-60**).

7. Claims 4-9, 10, 14-19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Passera (6,272,449) in view of Kuhn (6,343,267).

As to claim 4 and 14, Passera does not teach an eigenvector decomposition relating to the input data.

However, Kahn teaches

Art Unit: 2654

determining an eigenvector decomposition relating to the input data (**eigenvectors generated from speakers, col. 7, lines 8-9**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use eigenvector decomposition via data clustering in order to improve speed and efficiency at which speaker and environment adaptation is performed, as taught by Kuhn, (**col. 1, lines 39-40 and 45, 50-59**).

As to claim 5 and 15, Passera teaches, creating a predetermined number of non-overlapping subsets (**col. 4, lines 59-61**).

Passera does not explicitly teach determining eigenvector projections.

However, Kuhn teaches adapted to determine vector projection coefficients (**coefficients, col. 7, line 64**) onto the set of eigenvectors ("**eigenvector**", **col. 8, line 52 and col. 2, line 34**) in the eigenvector decomposition ("**eigentransformation vectors**", **col. 16, line 35**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use Passera's data subsets and Kuhn's eigenvector projection in order to improve speed and efficiency at which speaker and environment adaptation is performed, as taught by Kuhn, (**col. 2, lines 16-19**).

As to claim 6 and 16, Passera does not teach the recited probability density.

However, Kuhn teaches determining a probability density for the vector of projection coefficients (**probability density for vector...from coefficient, col. 5, lines 30-36**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to predetermine subset model for determining probability density because Kuhn teaches that this will improve speed and efficiency at which speaker and environment adaptation is performed, (**col. 1, lines 39-40, 61-62 and col. 2, lines 16-19**).

As to claim 7 and 17, Passera teaches,

yield the at least two sets of output data based on their relation to the threshold ("**threshold value**", **col. 5 lines 37-41, 46-47; Fig. 5 step 52; and Fig. 4 subspace<sub>1</sub>, 2**).

Passera does not teach doing this for projection coefficients.

However, Kahn teaches projection coefficients (**projection col. 2, line 59 and coefficient, col. 7, line 64**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to relate threshold values for projection coefficient data in order to generate an adaptive model for speech.

Passera teaches assigning at least one threshold (**col. 5, line 56**), but does not teach of relating the threshold to a probability distribution value.

However, Kuhn's teaches maximum likelihood involving probability density (**col. 5, lines 30-31 and col. 10, lines 31-33**); and

At the time of the invention, it would have been obvious to one of ordinary skill in the art to assign threshold values based on probability density for clustering accuracy because the probability distribution function describes the plurality of parameters based

Art Unit: 2654

on observed data from speakers, thus weights the data which is informative more heavily, as taught by Kuhn, (**col. 5, line 24, 29 and col. 8, lines 60-62**).

As to claims 8 and 18,

Neither Passera nor Kuhn teaches N-1 threshold values.

However, Official Notice is taken that it would have been obvious to one of ordinary skill in the art at the time of invention that one necessarily needs N-1 thresholds for splitting data into N clusters.

As to claim 9 and 19, Neither Passera nor Kuhn teach the threshold is a value of the function relating to the projection coefficients for which the probability distribution function equals  $m/N$ , where m is a number from 1 to N-1.

However, Official Notice is taken that it would have been obvious to one of ordinary skill in the art at the time of invention that for the equal probabilities of correct clustering, one needs to set an equal probability threshold, for 2 clusters setting it to  $\frac{1}{2}$ , for 3 clusters to  $\frac{1}{3}$ , etc.

8. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Passera (6,272,449) in view of Beigi (6,253,179).

As to claim 10 and 20, Passera teaches, data clustering (**col. 1, line 12**).



Passera does not teach of speaker verification.

However, Beigi teaches relates to the enrollment of target speakers in a speaker verification system (**speaker verification and clustering of data, col. 8, line 19-20 and 44**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use speech data clustering in a speaker verification system in order to have training data for speaker models.

### **Conclusion**

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure Bahl et al. (6,058,205), Shamir et al. (10,221,476), Gao et al. (6,073,096), Takahashi et al. (6,064,958), and Moghaddam et al. (5,710,833), Sharma et al. (5,862,519).

Bahl teaches space classifier using threshold chosen (N-1).

Shamir teaches classifying elements and measuring similarity values.

Gao teaches pre-cluster systems from test speaker.

Takahashi teaches pattern recognition using probability modeling.

Moghaddam teaches probability density for input models.

Sharma et al. teaches segmenting speech into subword segments, speaker verification and data clustering application.

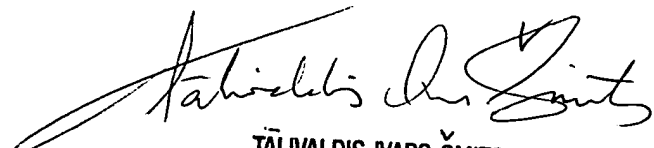
2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Myriam Pierre whose telephone number is 703-605-1196. The examiner can normally be reached on Monday – Friday from 5:30 a.m. - 2:00p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Smits can be reached on 703-306-3011. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MP

12/22/2004



TĀLIVALDIS IVARS ŠMITS  
PRIMARY EXAMINER